

Influence of pathogens causing clinical mastitis on reproductive variables of dairy cows

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Why is this important?

Mastitis is an infection of the mammary gland, typically caused by bacteria, resulting in an inflammatory response. Clinical mastitis involves abnormal milk production, change in appearance to the udder (e.g. inflamed, red), and sometime systemic signs (e.g. fever). Sub-clinical mastitis does not result in a change in milk appearance, but does result in increased SCC due to inflammatory cells moving into the affected quarter(s). Mastitis continues to present significant challenges to dairy producers around the world, impacting not only cow health and welfare, but also reproduction, milk production and a producers' bottom line. A recent Canadian study found that the cost of mastitis (both clinical and sub-clinical) to dairy producers is around \$662/cow-year (including costs related to milk yield reduction, culling, and implementation of preventive measures).

With respect to reproduction, cows with clinical mastitis require more AI events due to a lower conception rate, longer intervals between calving and first AI, greater pregnancy losses, and more days open. These issues are also present in cows with sub-clinical mastitis, although possibly to a lesser extent.

The objective of this study was to investigate the effect of clinical mastitis caused by different pathogens on reproductive variables following AI in dairy cows.

What did we do?

This study was conducted on 5 commercial dairy herds with an average milk production of 30 kg/cow/day, SCC lower than 400,000 cells/mL, an active program of mastitis control, use of herd management software, and at least 200 cows in milk. A total of 833 lactating Holstein cows were enrolled.

Cows diagnosed with mastitis were classified into a major pathogens group (*Staphylococcus aureus*, *Streptococcus agalactiae*, *Escherichia coli*, *Klebsiella* spp., *Mycoplasma* spp., *Streptococcus uberis*, or *Strep. dysgalactiae*) and a minor pathogens group (CNS or *Corynebacterium* spp.), and also divided into a gram-positive bacteria group (*Staph. aureus*, CNS, *Strep. agalactiae*, *Strep. uberis*, or *Strep. dysgalactiae*) and a gram-negative group (*E. coli* or *Klebsiella* spp.). Cows in the control group did not have mastitis between calving and pregnancy. Reproductive indices of each cow included pregnancy per first AI, pregnancy loss (from 30 to 60 d of gestation), and days open.



What did we find?

Pregnancy per first AI was greater in the control group than in the major pathogens group, but the minor pathogens group was not different from either the major pathogens or the control group. Additionally, pregnancy per first AI was greater in the control group than in the gram-negative group, but the gram-positive group did not differ from either the control or gram-negative group.

Pregnancy losses were greater in the major pathogens group than in the control group, but did not differ between the minor pathogens group and either the control or major pathogens group. Pregnancy losses were greater in the gram-negative group than in the control group and gram-positive group, but no difference was seen between the gram-positive group and the control group.

A significant difference was found for days open between control and mastitic cows (major and minor) as well as between the minor and major pathogens groups. Days open were significantly lower in the control cows than in mastitic cows, particularly cows in the gram-negative group, which had more days open than cows in the gram-positive group.

What does it mean?

Overall, cows affected by mastitis caused by more pathogenic bacteria (major group) had poorer reproductive performance (lower rate of pregnancy per first AI, increase in pregnancy loss, and increased days open) compared with cows in the control group and those with mastitis caused by less pathogenic bacteria. However, it is important to note that even those pathogens causing mild clinical mastitis are able to disrupt reproductive performance, even if this is not as dramatic as major pathogens.

These findings reiterate the importance of having a comprehensive mastitis control and herd health plan(s). Controlling mastitis in a dairy herd will result in improved milk production and quality, improved cow health and wellbeing, as well as improved reproductive performance.

Summary Points

- Healthy (non-mastitic) cows had a higher rate of pregnancy per first AI, reduced pregnancy loss and days open compared to mastitic cows.
- Cows diagnosed with mastitis caused by major pathogens and gram-negative bacteria suffered more substantial losses in performance.

Table 1. Effects of mastitis caused by different groups of pathogens or by Gram class on reproductive variables.

Group	Pregnancy/first AI, %	Pregnancy loss, %	Days open, d
Control	32.6 ± 0.02 ^{a,A}	12.8 ± 0.02 ^{a,A}	129.5 ± 1.9 ^{a,A}
Minor	26.2 ± 0.03 ^{ab}	16.7 ± 0.02 ^{ab}	162.0 ± 4.1 ^b
Major	20.1 ± 0.02 ^b	22.2 ± 0.02 ^b	175.1 ± 3.7 ^c
Gram-positive	23.8 ± 0.02 ^{AB}	17.2 ± 0.02 ^A	172.7 ± 4.1 ^B
Gram-negative	15.4 ± 0.03 ^B	30.1 ± 0.03 ^B	191.1 ± 7.5 ^C

^{a-c}Means or percentages within a column followed by different lowercase letters are significantly different (control vs. major vs. minor)

^{A-C}Means or percentages within a column followed by different uppercase letters are significantly different (control vs. gram-negative vs. gram-positive)